

# Urban agriculture in Havana, Cuba and its implementation in Finland

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Degree Thesis for Bachelor of Natural Resources

Degree Programme in Horticultural Production

Raasepori 2015

**BACHELOR'S THESIS**

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**Degree programme: Horticultural production**

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**Title: Urban agriculture in Havana Cuba and its' implementation in Finland**

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**Date 21.4.2015**

**Number of pages 39**

**Appendices 1**

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**Abstract:** This Bachelors thesis presents information about urban agriculture in Havana, Cuba. The aim is to study what kinds of cultivation methods are used in urban agriculture in Havana. What is cultivated and by whom and could the same methods be implemented in urban gardening in Finland?

In developed countries such as Finland people have grown apart from food production. Probably partly as an objection to this it has become more popular to cultivate some of your own foodstuffs organically in the cities. In developing countries such as Cuba it is a part of the national food security.

Cuba has an urban agricultural system that is almost completely organic and the producer to consumer chain is one of the shortest in the world. The starting points for urban agriculture are very different in Cuba compared with Finland and the climate is also totally different. Thus the implementation of many Cuban cultivation methods is not possible in a Finnish environment.

The methods for collecting the material for this thesis were qualitative. I interviewed thirteen farmers in Havana and visited sixteen different sites altogether in the spring of 2012. The theory part was collected from several literary sources on the subject of urban agriculture and Cuban history.

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Language: English    Key words: urban agriculture, Cuba

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**OPINNÄYTETYÖ**

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**Koulutusohjelma ja paikkakunta: Trädgårdsnäring, Raasepori**

**Ohjaajat: Anna Granberg ja Elina Regårdh**

**Otsikko: Kaupunkiviljely Havannassa Kuubassa ja sen käyttöönotto Suomessa**

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**Pvm. 21.4.2015**

**Sivumäärä 39**

**Liitteet 1**

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**Tiivistelmä:** Tässä opinnäytetyössä esitellään Kuuban Havannassa tapahtuvaa kaupunkiviljelyä. Työn tarkoituksena on selittää, minkälaisia viljelymenetelmiä Havannassa käytetään, mitä kasveja siellä viljellään, sekä kuka niitä viljelee. Lisäksi selvitetään voitaisiinko samoja menetelmiä ottaa käyttöön kaupunkiviljelyssä Suomessa. Kehittyneissä maissa, kuten Suomessa, ihmiset ovat kaukana ruoan tuotannosta ja luultavasti osaksi vastalauseena tälle on tullut suositummaksi viljellä luonnonmukaisesti joitain omia elintarvikkeita kaupungissa. Kehittyvissä maissa, kuten Kuubassa, kaupunkiviljely on osa kansallista ruokaturvallisuutta. Kuubassa kaupunkiviljely on lähes kokonaan luonnonmukaista ja tuottaja-kuluttajaketju on yksi maailman lyhyimpiä. Lähtökohdat kaupunkiviljelylle ovat hyvin erilaiset näissä kahdessa maassa ja ilmasto on myös täysin erilainen. Näin ollen monien kuubalaisessa kaupunkiviljelyssä käytettyjen menetelmien käyttöönotto Suomessa ei ole hyödyllistä suomalaisessa ympäristössä. Tähän opinnäytteeseen kerättiin materiaalia kvalitatiivisin menetelmin. Työssä on haastateltu kolmeatoista viljelijää Havannassa ja vierailtu yhteensä kuudellatoista viljelmällä vuoden 2012 keväällä. Teoriaosa koostuu monista eri kirjallisuus- ja internetlähteistä, jotka käsittelevät kaupunkiviljelyä Kuubassa ja Kuuban historiaa.

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Kieli: englanti

Avainsanat: kaupunkiviljely, Kuuba

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**EXAMENSARBETE**

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**Utbildningsprogram och ort: Trädgårdsnäring, Raseborg**

**Handledare: Anna Granberg och Elina Regårdh**

**Titel: Stadsodling i Havanna, Cuba och kunde det tas i bruk i Finland**

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**Datum 21.4.2015**

**sidor 39**

**annex 1**

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Abstrakt: Examensarbetet beskriver stadsodling i Havanna, Cuba. Syftet är att studera hurdana odlingsmetoder som används i Havanna, vad de odlar och vem som odlar. I arbetet udleds om dessa metoder kunde tänkas utnyttjas för stadsodling i Finland. I utvecklade länder som Finland har människorna fjärmats från matproduktionen. Antagligen som en protest mot det industrialiserade jordbruket har människorna börjat odla egna ekologiska matprodukter inne i städerna. I utvecklingsländer som Cuba är stadsodling en del av den nationella mattryggheten.

Cuba har ett stadsodlingssystem som är nästan helt ekologiskt, och kedjan mellan producent och konsument är en av de kortaste i världen. Grunderna för stadsodling är väldigt olika jämfört med Finland lika så klimatet. Detta medför att många av de kubanska odlingsmetoderna inte är användbara i finländsk miljö. Metoderna för samling av information var kvalitativa. Jag intervjuade tretton odlare i Havanna och besökte sexton orter under våren 2012. Teoridelen är samlad från litteratur och internetkällor som behandlas stadsodling i Cuba samt Cubas historia.

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Språk: engelska

Nyckel ord: stadsodling, Cuba

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## **1. Introduction**

Nowadays people have grown apart from food production, which is mostly managed industrially with high chemical inputs in the rural areas away from the eyes and minds of urban people. If you try to find close by and organically produced food, you will probably not find it at the supermarket round the corner. You will need to go to a special niche organic product shop and pay a high price for it. If we could, would we not rather buy produce that we know where it is grown and what has been put in to them? It seems that partly as an objection to this urban agriculture is has become more popular all over the world. People are also moving from the countryside to the cities at an increasing pace. Thus it is inevitable that also the production of food has come closer to the urban centres. In rich developed countries such as Finland urban agriculture is mainly a trend and a collective way of spending time together. Urban gardening gives a possibility to get involved in the production of food and it is a way to make the cities greener and more pleasant to live in. In poor developing countries such as Cuba it is done mainly because it is a necessity for the national food security.

The aim of this study was to research urban agriculture in Havana, Cuba and to find out how it differs from urban agriculture in Finland. The aim was to see what kinds of methods are used in today's Cuba in the various kinds of urban agricultural sites and whether any of these methods could be adapted in Finland. What kind of produce is cultivated in these urban agriculture sites, where does the produce go and by whom is it managed?

This study consists of observations and personal interviews that were conducted in the spring of 2012 during a 3-month period in Havana at different urban agricultural sites. In addition various literary sources have been used including books on urban agriculture and Cuban history, university and other studies on urban agriculture, Internet sources and Cuban newspapers.

I want to thank the Rikala Gardening association and the Swedish student fund for the grants that made my trip to Cuba possible.

## **2. Historical background for urban agriculture in Cuba**

Food was established as a basic human right in Cuba in the 1959 revolution and the aim of the national agricultural sector was to be self-reliant in foodstuffs. However, during the next thirty years between 1960 and the early 1990s Cuba was dependent on importation to fill the nutritional needs of its citizens. More than 30 per cent of its farmland was devoted to the monoculture of sugar, which was the main export crop. The country exchanged its sugar and citrus produce with its COMECON (The economic union of the Soviet Union and its allies) partners for products that were not possible to produce on the island such as petroleum, petroleum based fertilizers and pesticides, spare parts for agricultural machinery and processed food. The Soviets paid five times the market price for sugar and bought 95 % of the citrus crops. (Buncombe, 2006).

Up until the mid 80's over 50 per cent of the total foodstuffs that were consumed in Cuba were still imported (Murphy & Novo, 1998). Cuba's food security was very sensitive to interruptions in importation due to two reasons: agricultural land in Cuba was disproportionately used for export crops rather than producing food for its own people. It was almost impossible to cultivate temperate-zone crops such as soybeans and wheat, both essential in the Cuban diet, in the tropical climate. In addition, the United States was concurrently imposing trade restrictions on Cuba, which culminated in a total embargo by 1962. (Koont, 2011).

## **2.1 Special period caused by the United States trade embargo**

These trade restrictions banned the export of food and medicine to Cuba and prohibited foreign corporations from doing business with Cuba. Cuba began the rationing of food amongst its citizens, which is still in force today. When the Soviet block collapsed in 1989-1991, Cuba faced a disastrous situation. The Cuban economy was hit hard on every level, including agriculture. It lost up to 85 per cent of its external trade and all economic-aid relations with the Socialist Block. The government declared a 'Special period' in time of peace and declared that citizens had to make sacrifices, which were usually only imposed during wartime. The entire Cuban agriculture essentially collapsed between the years of 1989-1995. The nutritional intake of the Cuban population fell below the FAO (Food and Agriculture Organization of the United Nations) recommendations for a healthy diet. (Koont, 2011).

The black market flourished and food prices skyrocketed. Many food items disappeared from the state's distribution chains causing scarcity in the ration system. Because the transportation system was also in a state of crisis due to lack of fuel many vegetables and fresh fruits rotted in the fields and warehouses. Urban areas were hit the hardest and so many people in different communities

started taking over empty lots and farming to be able to feed themselves. (RUAF, Food production in the community by the community and for the community. w.y.).

## **2.2 The birth of urban agriculture in Cuba**

The birth of today's flourishing urban and peri-urban agriculture movement in Cuba can be traced to a specific date which is 27 December 1987. It was on that day that the central Committee of Cuba's Communist party called for action everywhere in the nation to promote intensive horticulture. They started using a technology that is known as organoponics. (FAO 2015).

In 1989 the local government authorized people to use vacant state owned lots of land in and around the city free of charge and so initiated the development of urban agriculture in Havana.

A system of support was created between the government of the city of Havana, the Ministry of Agriculture and existing institutions to provide technical support for motivating and training citizens in the agricultural management of these empty lots. Several government bodies (People's councils) and social organizations such as the Federation of Cuban women and the Committees for the Defence of the Revolution collaborated and offered additional support. This collaboration helped in achieving the high level of development of Havana's urban agriculture, still seen today. (Cruz & Medina, 2001).

Cuba took a whole new perspective on its agricultural system after a law called 142 was passed which allowed 70% of agricultural land to be managed by independent producers, peasant organizations and cooperatives through usufruct rights, recites Burchardt. (Premat, 2012).

It transformed from the conventional large-scale, high-input mono-crop agriculture that was aimed for export to a smaller scale semi-organic urban farming system that produces food for local consumption. (Koont, 2001) According to Rosset and Benjamin foreign specialists called it "the largest conversion from conventional agriculture to organic or semi-organic farming that the world has ever known" (Premat, 2012. p. 3).

Havana's gardens really began to blossom when in 1993 the Ministry of Agriculture restructured urban land use rights. They facilitated the use of vacant plots. As long as the plot was used for cultivation, it would remain under the farmers control with permanent usufruct rights. The Department of Urban Agriculture began spreading information about new technologies, the distribution of seeds and tools and sharing other information with locals who had no farming



experience. Even locals with farming backgrounds did know little of the small-scale organic farming which was necessary in urban cultivation. Collective farms and cooperatives for credit and service (CCS and CPA) were formed all around the city to help independent farmers. (RUAF, FOOD production in the community by the community and for the community. w.y.).

### 3. Urban agriculture in Cuba today

Urban agriculture in Cuba is essentially organic small-scale agriculture practised near urban populations and using very little petroleum and machinery. The top overseer of the urban agriculture movement, the National Group for Urban Agriculture (GNAU, *Grupo Nacional de Agricultura Urbana*) defines urban agriculture as “the production of food within the urban and peri-urban perimeter, using intensive methods, paying attention to human-crop-animal-environment interrelationships, and taking advantage of the urban infrastructure with its stable labour force. This results in diversified production of crops and animals throughout the year, based on sustainable practices which allow the recycling of waste materials”. (Koont, 2011 p.29).

There are 383,000 urban farms in Cuba that cover 50,000 hectares of otherwise unused land. These farms produce more than 1, 5 million tons of vegetables. The top farms reach a yield of 20 kg/m<sup>2</sup> per year of edible plant material and this is without synthetic chemical inputs. About per cent of all the fresh vegetables consumed in big cities like Havana and Villa Clara are produced on urban farms. No other country in the world has reached such a level of success with a form of agriculture that uses ecological services of biodiversity, and reduces transportation miles, energy use and effectively closes consumption cycles and local production. There have been brief upturns in the food import dependency in Cuba due to natural and human-made disasters but the overall data shows that it has dropped for decades. In root crops such as sugar, vegetables and fruits Cuba has gained great success. The import dependency is only 16 %. (Altieri and Funes-Monzote. 2012).

In Havana counted 97 high-yielding organoponic gardens, 318 intensive gardens and 38 ha of semi-protected gardens in 2013. The urban and peri-urban agriculture sector of Havana includes five agricultural enterprises, which manage about 700 crop farms, 170 cattle farms, and 27 tree production units. In addition they have two provincial companies specializing in pig and livestock production, 91 service and cooperative that grow vegetables and flowers and raise animals and 29 agricultural cooperatives. The estimated total area that is under cultivation is about 35 900 ha. In 2012 the production included 63 000 tonnes of vegetables, 20 000 tonnes of fruit, 10 000 tonnes of roots and tubers, 1700 tonnes of meat and 10,5 million litres of buffalo, cow and goat milk. In addition to this there are 89 000 backyards 5100 plots smaller than 800 m<sup>2</sup> in which the local

families grow fruit, vegetables and condiments and raise small animals such as poultry and guinea-pigs for their own consumption. An estimated 90 000 inhabitants in Havana are participating in some form of urban agriculture. (FAO 2015).

### **3.1 The support systems in urban agriculture in Cuba**

The governments extensive support for urban agriculture in Havana particular has alleviated its` success greatly. This support has taken various forms such as the allotment of state lands to be used as garden lots in usufruct, the promotion of research on sustainable technologies, the distribution of related knowledge by agricultural delegates appointed to each level of government and the provision of affordable agricultural inputs to urban farmers through the Agricultural goods and services centres (TCA, *Tiendas Consultorios Agropecurias*). (Mougeot, 2005).

There are 52 agricultural stores in the 15 municipalities. These stores provide technical services, advice and training to the city farmers. They also sell seeds, soil improvers, vermin-compost, biological pest control agents and tools and veterinary supplies. All urban farmers in Havana have access to agricultural insurance and the possibility for production loans from Havana`s *Banco Metropolitano*. (FAO 2015).

The support system includes municipal seed farms, composting units, veterinary clinics, and centres for the reproduction of biological pest-control agents. There is also training of producers and technicians and help to introduce new technologies, crop varieties and animal breeds. (FAO 2015).

The Urban Agriculture Department works together with agricultural research centres to determine how they can most efficiently serve the needs of city farmers. Probably one of the most prominent of these institutes is the National Institute for Basic Research in Tropical Agriculture (INIFAT). INIFAT recognizes the importance of local knowledge and that learning from the gardeners is as important as teaching them. (Murphy and Novo, 1998).

### **3.2 Different types of urban agricultural sites**

The first urban agriculture gardens were started by people reacting to the shortage of food in empty lots or vacant patios, rooftops and their own gardens. Due to the lack of pesticides and fertilizers, which had formerly been brought from the Soviet block, a more agro-ecological system had to be developed because the soil was getting tired. In addition it was essential to begin producing food

locally as the fuel shortage made it impossible to bring produce to the cities from further away. (RUAF, Food production in the community by the community and for the community, w.y.).

Over the years various different kinds of urban agricultural gardens have been formed for slightly different distribution purposes, they vary in how they are managed and for whom the produce is meant. Table one introduces the different kinds of sites found in Cuba today.

**TABLE 1. AGRICULTURAL LAND TENANCY IN CUBA**

<b>Name of unit</b>	<b>Form of tenancy</b>	<b>Tenancy/status</b>	<b>Description</b>
Cooperativa de Produccion Agropecuaria (CPA)	Collective	Private	A cooperative formed by farmers who merge their individual holdings into the cooperative
Cooperativa de Créditos y Servicios (CCS, CCS Fortalecida)	Mixed collective and individual	Mixed private and usufruct	Land held by individual small farmers who have joined a cooperative to obtain credit and services
Unidad Básica de Producción Cooperativa (UBPC)	Collective	Usufruct	A cooperative of individuals who join together to collectively farm lands made available to them by the state in usufruct
Parcela	Individual	Usufruct	Plot of land obtained by an individual in usufruct from the state for the purpose of growing food
Patio	Individual	Private	Home garden planted for personal consumption or small scale sale
New state farms (Fincas and empresas)	State	State	Farmlands that have stayed in the hands of the state and been reorganized into smaller units growing crops for public consumption and export
Autoconsumo units for state enterprises	State	State	Self-provisioning gardens for the workers for a particular state enterprise
Ministerio del interior (MININT)	State	State	Interior ministry managed lands used on meeting the ministry's self provisioning needs
Ministerio de las Fuerzas Armadas Revolucionarias (MINFAR)	State	State	Land controlled by the Armed Forces used for provisioning military units with food

Table 1. (Koont, 2011 p.33)

### 3.3 Forms of urban agriculture in Cuba

The National Group for Urban agriculture recognizes four types of land on which urban agriculture is practiced in Cuba. They are distinguished more by their nature than their size.

- a) *Organopónicos*** – This high-yielding horticultural production system is a Cuban invention. It uses organic substrate that comes from crop residues, household wastes and animal manure. It is ideal for growing crops on poor soils and in small urban spaces. (FAO 2014). This is the form of urban agriculture that characterizes urban agriculture in Cuba the best. In these production units food is grown in rectangular cultivation beds (*canteros*) that have low-level wood, brick, stone or concrete walls. The beds are about 1m by 15-30m in size and contain usually drip irrigation and organic soil. (Koont, 2011).

Figure 1. Organopónico, May 2012, Havana, Cuba

In a technical manual on organopónico production GNAU gives very precise specifications concerning the composition of cultivation beds and also for the planting beds in intensive gardens (*huertas intensivas*). For organopónico gardens it directs that the raised beds should optimally be 1.2m in width and between 15-25 m in length and never longer than 30 m. The beds should be placed perpendicular to the gradient of the terrain and when possible should run north-south for best sun exposure. The trench where the substratum is placed and the crops planted should be dug to a depth of 30 cm. The standard passage ways between the beds should be 0,5 m wide with wider passageways of 2m to no more than 3m placed between groups (*baterias*) of beds as needed to facilitate harvesting and other practical work. (Koont 2011).

There are also semi-protected organopónico gardens that are under awnings and the soil is enriched with vermicompost (FAO 2014). The awnings are made of agro-textile shade cloths that protect plants from the intense tropical sun. This extends very effectively the production season to year round. Otherwise the summers would be too hot for vegetable production in Cuba. In addition these awnings provide a partial protection against airborne pests and from heavy rains (Koont, 2011).

Figure 2. Semi- protected organopónico garden, May 2012, Havana, Cuba

- b) *Huertas intensivas*** – The intensive gardens are similar to organopónicos in all other aspects of the cultivation techniques except that they are on ground level rather than in raised beds. This gives more flexibility in use of space and the size of the planting beds is not specified. Intensive gardens produce roughly about 60 or 65 per cent of the yield per area compared to organopónicos.
- c) *Parcelas*** – *Parcelas* are parcels of land that have not been used before and are given to an individual in usufruct as long as the individual maintains an acceptable level of agriculture production. These are identified from intensive gardens and organopónicos by the fact that the farmer or the livestock raiser does not use the sophisticated cultivation technologies that are characteristic for the two categories
- d) *Patios*** – Every Cuban is encouraged to keep a patio or a home garden primarily for their own use. They are allowed to sell and barter any produce that they do not consume themselves. About 400, 000 patios of the million that exist are registered with GNAU. The registration entitles the gardener access to discounted supplies, technical advice and extension services.

In year 2006 the average yields in vegetables and fresh condiments were in patios 5.79 kg/m<sup>2</sup>, in *parcelas* 6-8 kg/m<sup>2</sup>, in intensive gardens 11.3 kg/m<sup>2</sup> and in organopónicos 18.44 kg/m<sup>2</sup>. (Koont, 2011).

### 3.4 Products cultivated in urban gardens in Cuba

The urban agriculture movement is divided into several categories and subprograms. There are three categories that have 28 subprograms. Crop category has 12 subprograms, animal raising has seven subprograms and support areas has nine subprograms. Below is a list of the crop category.

#### Crops

- Vegetables and fresh condiments
- Medicinal plants and dried herbs
- Fruit trees
- Small-scale rice production
- Ornamental plants and flowers
- Forest, coffee and cocoa trees
- Small-scale banana production tropical root crops and tubers
- Oil-bearing crops

- Beans
- Maize and sorghum
- Semi-protected Organoponic cultivation

(Koont, 2011 p. 40).

## Main crops grown in Havana

The main crops are categorized into four different categories; Vegetables, fruits, viandas and others.

### Vegetables

Beets	<i>Beta vulgaris</i>
Cabbage	<i>Brassica oleracea</i>
Carrots	<i>Daucus carota</i>
Celery	<i>Apium graveolens</i>
Chard	<i>Beta vulgaris</i>
Chives	<i>Allium ascalonicum</i>
Corn	<i>Zea mays</i> L.
Cucumber	<i>Cucumis sativus</i>
Eggplant	<i>Solanum</i>
Garlic	<i>Allium sativum</i> L.
Green Beans	<i>Phaseolus vulgaris</i>
Lettuce	<i>Lactuca sativa</i>
Okra	<i>Abelmoschus esculentus</i>
Onion	<i>Allium cepa</i>
Peanut	<i>Arachis hypogaea</i>
Pepper	<i>Capsicum frutescens</i>
Spinach	<i>Spinacia oleracea</i>
Squash	<i>Cucurbita maxima</i> .

### Fruit crops

Avocado	<i>Persea americana</i>
Banana	<i>Musa paradisiaca</i>
Banana	<i>Musa balbisiana</i>
Chirimoya	<i>Annona chirimola</i>
Coconut	<i>Coco nucifera</i>

Grapefruit	<i>Citrus paradisi</i>
Grapes	<i>Vitis</i> spp.
Guava	<i>Psidium guajava</i>
Sour Oranges	<i>Citrus aurantium</i>
Soursop	
(or sweetsop)	<i>Annona squamosa</i>
Lime	<i>Citrus aurantifolia</i>
Mandarin	
Orange	<i>Citrus nobilis</i>
Mango	<i>Mangifera indica</i>
Mamey	<i>Calocarpum sapota</i>
Melon	<i>Citrullus vulgaris</i>
Orange	<i>Citrus aurantium</i>
Papaya	<i>Carica papaya</i>
Pineapple	<i>Ananas comosus</i>
Passion Fruit	<i>Passiflora</i> spp.
Tamarind	<i>Tamarindus indica</i>
Tomatoes	<i>Lycopersicon esculentum</i>

**Viandas** (own explanation = crops that have the same amount of fattening qualities as potato; e.g. about as much starch as potato)

Cassava	<i>Manihot esculenta</i>
Plantain	<i>Musa balbisiana</i>
Potato	<i>Solanum tuberosum</i>
Sweet Potato	<i>Ipomoea batatas</i>
Taro	<i>Alocasia</i> spp.
Pigeon pea	<i>Cajanus cajan</i>
Black beans	<i>Phaseolus</i> spp.
Red beans	<i>Phaseolus</i> spp.
Soy beans	<i>Glycine max</i>
Garbanzos	<i>Garbanzos</i>

### **Others**

Rice	<i>Oryza sativa</i>
Sugar Cane	<i>Saccharum officinarum</i>



(Source FAO, 1990; Moskow, 1995 & Chaplowe, 1996; Murphy 1999. p. 28).

### 3.5 Distribution of produce

One of the key priorities of urban agriculture is to keep the producer-to-consumer chain as short as possible. Nearly 60% of the vegetables grown are sold directly to the public straight from the production units. The cooperatives (CCS, SPA and UBPC) also have thousands of nearby points of sale.

Figure 3. Point of Sale at *Vivero Alamar*, April 2012, Havana, Cuba

Figure 4. Point of sale at *Finca Integral Productiva Los Laureles* , April 2012, Havana, Cuba

Production in patios amounts to around one fifth of the total output, even though, this produce is primarily meant for consumption by a sole family.

In addition the Ministry of Domestic Trade and the Ministry of Agriculture (MINAG) run a state run system of agricultural markets: MAE (state market for agricultural goods) and MAL (free market for agricultural goods) which operate on a ‘free’ supply and demand system and control the prices of produce, but these amount to just over 10% of total output distributed to schools, day-care centers, hospitals and so forth. (Koont, 2011).

**TABLE 2. DISTRIBUTION OF VEGETABLES AND FRESH CONDIMENTS PRODUCED IN URBAN AGRICULTURE**

Destination	Metric tons	Pct. of total output
Direct sales to the public	2,492,523	59.41
State markets (MAEs)	419,612	10.0
Schools	60,102	1.43
Day-care centers	6,149	0.15
Hospitals	7,794	0.2

Other Social services	12,386	0.29
Universities	15,461	0.37
“Free” markets (MAL’s)	41,948	1.00
Worker self-provisioning at their workplaces	293,639	7.0
Post-harvest losses	96,481	2.4
Small agro-industry	82,117	2.0
Family consumption (patios)	647,697	15.4
Other uses	4,146	0.1
Animal feed (residues)	20,971	0.5

(Sources: Companioni Concepción 2006; Rodríguez Nodals, Companioni Concepción and González Bayon 2006. Koont, 2011 p.169).

### 3.6 The importance of small-scale production sites

The smaller-scale urban agriculture sites are very important for the locals because even though the *organopónicos* and intensive gardens have lower prices than the agricultural markets (*agromercados*), they are still too high for many Cubans. Many of the sites are distributed unevenly and so are often hard to reach without a personal vehicle like a car or a bicycle. Also the variety of products in different agricultural markets and UA-specific agricultural stalls (*punto de venta*) is uneven. Thus it is much more practical to produce these products yourself. In reality the Cubans can’t buy animal protein like rabbits, chicken or eggs because these are sold in “dollar stores” or in a few restaurants that are out of reach for the average Cuban’s budget. In other words the commercialized high-output urban agriculture sites such as *organopónicos* and intensive gardens do not equal for food security for all Cubans. (Mougeot, 2005).

## 4. Key issues of Cuban urban agriculture

There are several issues that are central to the success of agroecological production. The availability of necessary material inputs is a challenge in Cuba. There are three important inputs that are used in urban agriculture in Cuba which are dependant on human effort. These are seeds, organic and biological fertilizer and biopesticides. Other important issues are a constrained by geography and climate and the best an agricultural system can do is to conserve and utilize these inputs as adequately as possible. These are the use and conservation of soil and irrigation and drainage. Crop rotation and intercropping are also important to sustainable agricultural production.

### 4.1 Seeds

There are two different seed production customs. According to Hernandez and Perez (2006) the INIFAT (Alexander Humboldt Institute of Fundamental Research in Tropical Agriculture) ensures that the genetic plant pool in Cuba is preserved and that the research that is done leads to improved varieties. The first custom is performed at the National Seed Company (ENS) that has its own seed cultivation farms and they supply contracts with other farmers and farms growing seeds. (Koont, 2011). Today all the seeds planted in Cuba undergo a rigorous control to ensure their safety and effectiveness. There are two seed farms in each municipality in Cuban cities under GNAU's guidance that are devoted to seed production. These seed farms are under strict supervision and are required to have disinfection stations for people and vehicles and to have the minimum of two beehives to ensure pollination.

The second custom is the promotion of traditional seed cultivation on the agricultural plots themselves. The urban farmers who choose to grow their own seeds get direct technical assistance from extension agents and from the research institutes where new seed varieties are developed. They receive certification services, which enables them to produce, process and conserve seeds efficiently. (Koont, 2011).

## **4.2 Biological and organic fertilizers and pesticides**

The substratum in the cultivation beds consists mainly of compost, worm humus and bio-fertilizers. In addition to fertilizers the emphasis is on the production and distribution of biological and botanical pesticides.

### **Compost**

The composting is done in the various gardens of Havana and in addition there are more than 7000 organic fertilizer-manufacturing centres around the country. The material used in the compost of urban agriculture sites consist mainly of animal manure and plant residue left from harvesting and processing crops, recites Concepción (2007). (Koont, 2011).

### **Worm humus**

The excrement of the California red or *Eisenia foetida* -worm is the source of Cuban worm humus. It is extremely abundant in nutrients (1kg of excrement substitutes 10-16 kilograms of compost). This worm has been widely studied in Cuba even prior to the Special Period. Today Industrial production occurs at specialized UBPC's and the organic fertilizer manufacturing centres mentioned above. (Koont, 2011).

## Biofertilizers

Biological agents that increase the availability and absorbability of nutrients to plants, through roots or foliage are biofertilizers. In Cuba the agents used are; *Azotobacter chroococcum* from which a liquid can be produced that is applied directly to the seed and the soil, or it can be sprayed straight on the foliage of growing plants. It reduces or can even eliminate the need to apply nitrogen-containing petrochemical fertilizers. *Rhizobium* is a genus that is a well-known nitrogen-fixing bacteria. Fosforina is a solubilising agent that “unlocks” phosphorus and makes it more available to plants. *Arbuscular mycorrhizal* is a fungus that increases plant root systems and helps the absorption of soil nutrients. ( Koont, 2011).

## Biological and botanical pesticides

For successful agroecological cultivation the non-petrochemical pesticides are very important. In Cuba both biological and botanical pesticides are used. For the biological pesticides there are Centres for the Reproduction of entomopathogens and entomophages (CREEs) where scientists and technical specialists produce pre strains of local varieties of microbes, fungi and insects.

The other alternative is the using of plant extracts which are toxic to plant pests, including insects, mites and nematodes. The most widely adopted botanical pesticides in Cuba are the ones derived from Neem tree (*Azadirachta indica*). (Koont 2011).

## 4.3 Crop rotation and intercropping

The systems of crop rotation and intercropping are widely used in urban agriculture in Cuba. It is one of the main focuses of urban agriculture technology. There should be a proper mix of rotations and intercropping. At least six rotations of crops per hectare per year are recommended. Intercropping is recommended in at least half of the cultivation beds. Depending on the form of cultivation some crops are to be avoided and others recommended. Experiments are done continually with different combinations of plant species to find out which plants are better planted alone and which ones would benefit from intercropping. (Koont, 2011).

## 4.4 Irrigation

Water is often difficult to obtain in Cuba. Especially in the hot summer months there can be long periods of time when irrigation becomes a problematic matter. Because the urban gardens have to rely on rainfall so it has to be collected in various ways; in barrels or different types of containers. The digging of wells is often the reasonable solution. Thus it is extremely important to maintain a properly functioning irrigation system. Blockages should be avoided and so the maintenance of irrigation systems is very important. Often the issue of irrigation is depending on hard-currency availability so the types of irrigation systems that should be imported are delayed for the future. A lot of experiments are done with magnetized water. (Koont 2011).

## 5. The Future of urban agriculture

Cruz Hernandez and Medina (2001) recite in Mougeot's book that the future of urban agriculture as an essential part of the food production chain in Cuba is uncertain. Statistics show that even when some types of urban agriculture spaces such as the organopónico gardens have doubled in number over the last five years (Mougeot, 2005), others on the contrary have decreased. And this is what has happened with small-scale, self-provision-oriented food-production sites, such as *parcelas* and *patios*, recites Murphy (1999). (Mougeot, 2005). When in 1997 there were 26,000 officially registered urban agriculture sites meant for family self-provisioning by the year 2000 there were only 7944. According to Cruz Hernandez and Medina (2001) this was considered as a reflection of the country's economic recovery and that maybe the small-scale farmers had shifted to a more commercially oriented forms of agricultural production. (Mougeot, 2005). The global multinational corporation-based world creates pressure to introduce new patterns of land use that serve the needs of the wealthier part of the population. These high-input agricultural technologies cause local environmental damage by water supplies and degrading soils, and are the reason for climatic effects through their heavy fossil fuel use and by their role in diminishing biodiversity. Many marketed pesticides today can be toxic to the workers during the production processes and to the consumers via residues. It has been estimated that the processing and distributing of industrial food when the effects of deforestation are included accounts for about 50 % of all greenhouse gases that human activity is responsible of. (Koont, 2011). Much of the fossil fuels consumed in large-scale monoculture cultivation are due to the labour-saving machinery and for transport of foods in refrigerated conditions to distant retail markets. Shortening the production to consumer chain and the usage of organic pesticides and fertilizers in a system that supports local farming practises in small-scale is a scientifically based path well worth to consider. (Koont, 2011).

## 6. Facts about Cuba

The total population of Cuba is 11.27 million (2013)

The GDP is 68.23 billion (2011). (The World Bank)

President: Raul Castro

Government: Communist state

The capital and largest city: Havana 2.116 million inhabitants

Other large cities:

Santiago de Cuba, 554,400

Camagüey, 354,400

Holguín, 319,300

Guantánamo, 274,300

Santa Clara, 251,800

Geography/ Total area: 110,860 sq km

(Infoplease, 2000-2015).

Climate:

The Cuban climate is semitropical or temperate except in the mountains. The average minimum temperature is 21° C to average maximum of 27° C. The coastal areas are more habitable than the temperature indicates because of the trade winds and sea breezes.

The dry season is from November to April and the rainy season from May to October.

The average precipitation in the mountain areas is more than 180 cm, 90 -140 cm annually in most of the lowland areas and around Guantanamo bay less than 65 cm. Droughts are common and the eastern cost of Cuba is often hit by hurricanes from August to October. (Encyclopedia of the Nations, advameg inc.) Rainfall can vary greatly according to locality. The highest precipitation is in Pinar del Rio (ca 180 cm) and the lowest is in Guantanamo (ca 70 cm). In addition to hurricanes Cuba is subjected to earthquakes. (Louis & Perez, 1995).

Location:

Cuba is the western-most and the largest island in the Antillean archipelago, between 74° to 85° west longitude and 19°40` to 23°30` north latitude.

Topography:

Approximately 35% of the total land mass is made up of three mountain systems: the Sierra Maestra, the Guamuhay (Escambray) and the Guaniguanico, the highest point reaching 1981,2

meters. These three mountain ranges are set off from each other by two extensive plains that account for the rest of the entire island surface area and almost 95% of the total Cuban population. The soil is very rich and varied and is categorized into five different groupings and is highly prized for crop production. The Savannah terrain in Cuba consists of dry soils of considerably shallow depths, there is vast stretches of grassland that has some shrubbery, sparsely scattered grasses and trees. The forest areas are located on the slopes of the mountains and the pine forests today cover less than 5 percent of the national territory. On the low coastal zones and offshore keys there are swamp soils which are mainly water-soaked clay that is covered with mangrove, sawgrass and palms. There are two hundred rivers and the water levels can rise significantly during the rainy seasons and seasonal flooding is very common. There are also subterranean river basins that have contributed in to the development of extensive cave systems. (Louis & Pérez, 1995).

#### Education level:

In the United Nation development report that ranks the secondary education levels of countries Cuba ranked 44th. (for comparison, Finland is on 24th place) (United Nations Development Program, 2013).

#### Monetary system:

Cuba's official currency is the Cuban peso (CUP). This is used for a limited number of services and products such as public transport, vegetables and fruits and for buying pizza or coffee from the street. In addition there is a tourist currency, the Cuban convertible peso (CUC), which was introduced by the Cuban financial authorities to take out all foreign currencies from circulation. It offers an alternative that is almost equal to the US dollar. Some places only accept Cuban pesos and some which are usually tourist related establishments such as hotels, restaurants and so called 'dollar shops' accept only convertible pesos. The change rate of the Cuban Peso with the Convertible Peso is 1/24. (Cubaseek, 2005).

## 7. Urban agriculture globally

Urban agriculture has increased throughout the world for the past two decades in poor and rich countries alike. Still there have been attitudes against urban agriculture on the governmental level for a long period of time. (Murphy, Gonzalez and Pinderhughes, 2000) By the year 2017 more than half of the world's population will be living in urban areas (WHO 2015). From the nine cities that are estimated to have more than twenty million inhabitants will be in developing countries. Feeding the growing populations is going to be the biggest challenge in agricultural history says Hubert Zandstra, the Director General of the International Potato Center (CIP). In the year 2001 an estimated 800 million people are engaged in some form in urban agriculture. (City Farmer 2001).

The global rural-urban migrations of the last half- century have populated cities in Latin America, Africa and Asia with poor rural migrants. These migrants often know how to grow food and are too poor to buy even cheap industrially produced food. In response to the situation many international and national institutions which focus on food and development issues have started to research the phenomenon of urban agriculture by funding projects and giving support and advice to local organizations that are involved in urban agriculture. (Koont, 2011). Leading agricultural scientists from such distinguished sources as for example the Consultative Group on International Agricultural Research (CGIAR) are entering into the study of urban agriculture's possibilities to fight against poverty amongst urban food producers and facilitating easier access to food for consumers. (City Farmer 2001).

The degree of importance of urban agriculture in different countries is very varied. The degree of public policy compared with the importance given to food security varies greatly from one country to another. In Zimbabwe, Cote d'Ivoire, Togo and Tunisia for instance, public policy on urban agriculture is not so developed, even though urban agriculture is a very important part of national food security. In Cuba and Argentina public policy is considered an important part of urban agriculture and its' role in food security. In some more developed countries like France and England very specific policies exist even though urban agriculture's role in food security is not very important. (Mougeot, 2005).

Marielle Dubbeling, the director of the RUAF foundation (resource centres on urban agriculture & food security) and coordinates the RUAF involvement in the UN Habitat program on "Integrating urban and peri-urban agriculture and forestry in city climate change programmes" writes that there is a need for more resilient urban food systems. (ICLEI, 2012) According to her growing urbanization, climate change and commodity price insecurity all make the urban poor more



vulnerable, with variations in fuel and food prices affecting the poor directly and worsening urban food security. Peri-urban agriculture, she continues, plays an important role in increasing urban population's access to fresh and nutritious food in addition to making use of urban waste resources, knowledge and materials. She concludes to say that urban and peri-urban agriculture of a sufficient scale can contribute to a more resilient food system, if it is well integrated to city planning and development and also to existing climate action plans. (Dubbeling, Marielle. w.y.).

## 7.1 Urban agriculture in Finland

In Finland urban agriculture is not essential for food security but rather has grown as a very popular hobby and collective way to spend time. There is also growing concern about the purity of foodstuff and the possibility to grow your own produce is gaining more and more popularity amongst urban dwellers who are interested in health and ecological issues. In Finland there is a long tradition of allotment gardens. In Helsinki there are 39 allotment garden areas and the waiting list is long. For example the urban gardening association Dodo has reacted to this by starting up new types of urban gardening sites around Helsinki since 2009. (Jyrkäs, w.y.). There are also a guerilla gardens in Finland that have been started up by residents. Guerilla gardening means gardening in the cities on land without the land owners permission or any legal rights to utilize. It can be on an abandoned site that is not being cared for or private property. It is a phenomenon that has built on the need to grow food but also as a statement against the kind of city life where everything is bought from the stores. In Herttoniemi, Helsinki there is a food co-operative Own Field - project (Oma pelto -projekti) that is the first of its kind in Finland. There is a hired gardener cultivating on the field. The associates of the co-operative get a part of the harvested crop in which they can participate in. The amount of the part depends on how much the field produces. The fee to participate in the co-operative is 100 euros to sign-in, 70 euros for the membership fee and 380 euros for crop fee. (Ritanen-Närhi, 2012).

Some organizations of forms of UA worth mentioning here are:

- **Hyötykasviyhdistys** – Finland's biggest gardening association promotes organic farming and plant diversification recovery. The association, founded in 1978 has approximately 7000 members. Preservation of old plants is one of the key tasks of this non-profit organization. They organize public lectures, courses and excursions and yearly seedling markets and harvest celebrations. (Hyötykasviyhdistys ry).
- **Dodo** – Kaupunkiviljelyjärjestö is an organization, which concentrates on environmental social issues, promotes sustainable business and emphasizes happiness by lessening the ecological impact

of urban living. They organize small-scale events like workshops and festivals, visits to schools and other educational events. (Dodo ry).

- **Lastenpuutarha** -In Kumpula there is a kids and youths garden that is managed in collaboration with the Helsinki cities social office and is funded by the Rikala gardening association and the Alli Paasikivi association. It is a family club that rents 20 garden allotments every summer. The families tend to their plots and learn about gardening and how to make use of the crop. ( Ritanen-Närhi, 2012).
- **Urban gardens** have become popular. In Helsinki they are found in several different locations for example in Käpylä, Kumpula, Kalasatama, Töölö and Vallila. Citizens grow all kinds of produce for their own consumption in these sites. (Dodo ry).

## 8. Methods and material

This research was conducted through interviews carried out in the spring of 2012 in various parts of Havana. Observing the sites was also a part of the method.

In addition I used several literature and internet sources on the subject of urban agriculture.

### 8.1 Qualitative research

Qualitative research is pervasive gathering of data. The legwork is done in natural environments. People are preferred as the instruments in data collecting and the researcher trusts more on observing and conversations than in information gathered from books and other literature based sources. As a basis for this is the view that a human is adaptive enough to settle into alternating situations. As a help to this the researcher can use forms and tests. The researchers aim is to find unexpected factors. That is why the starting point is not the testing of a theory or a hypothesis but the complex and elaborate analysis of the matter. What is important is not decided by the researcher. Such methods are preferred where the aspects and the “voice” of the subjects are heard. These types of methods are theme interviews, participating observing, group interviews and logic analysis of different documents and texts. The subject group is chosen appropriately, not randomly. The research plan develops as the study goes on. The research is implemented adaptively and the draft can be changed according to the existing circumstances. Incidents are dealt as unique and the material interpreted according to that. (Hirsjärvi, Remes & Sajavaara 1997).

## 8.2 Ethnographic research

Ethnographic research is a method that bases on observing targets in their natural environment. The idea is to observe, keeping a diary, taking field notes and pictures. Observations can be made at workplaces or homes; where ever and how ever people usually tend to manage their lives. The collecting of information can range from four hours up to several months. It can be used to find out how a certain product or a service could be used. It can involve personal interviews or maintaining a video diary. Ethnographic research can produce a lot of qualitative data and the analysis can be time-consuming. (Government Service Design Manual, w.y.).

## 8.3 Method

This research was conducted by both interviews and observation of urban agricultural sites. There were thirteen personal interviews and three visits to different sites.

In the interviews the subject was given space to expand their answer and to account also of their feeling and experiences. There was no pre- categorizing of answers in the questionnaire schedule. The idea was to try and investigate the subjects' interpretations of the social phenomenon and not to presume that all the topics of interest are known in advance. The aim is often in interpretation and understanding how and why. Not so much in fact finding recites Warren (1988). According to Arksey and Knight (1999) qualitative research method can be a valuable method for exploring peoples feelings, opinions and attitudes. Each style creates different type of information and different type of knowledge thus requiring a different kind of analysis. (UK Data Service, 2012-2015).

## 8.4 The interviewees

Twelve of the thirteen interviewees were men. Four of the interviewees were agronomists. The knowledge and experience of the gardeners varied greatly. The interviewees had cultivated between 2 and 40 years so ranged from the very inexperienced to those with very much knowledge. Many were pensioners who had cultivated for decades and some of the gardens had been cultivated for three generations. Most of them had cultivated for over 10 years. Some of them, like one married pensioner couple, mentioned quality time spent together to be the key factor as opposed to production or income. Many of the interviewees seemed to be older than fifty years and many of them were pensioners. The majority of interviewees (and gardeners in Cuba in general) were men but in the biggest and most organized garden I visited called *Vivero Alamar* most of the employees were women.



## 8.5. Selected sites

Map of Havana; <http://www.cubatechtravel.com/downloads/DestinationsRouteMaps/Ciudad-de-La-Habana.jpg>

I visited sixteen different urban cultivations or gardens in seven different municipalities in Havana. In three of them I just visited and observed and in thirteen I did an interview. The municipalities were *Santa Catalina*, *Cotorro*, *San Miguel Del Padron*, *Alamar*, *Luyano*, *Santos Suarez* and *Poye*.

These sites were chosen mainly on the basis that I was allowed passage to them. There were five organoponicos, one family run farm (*campesino*), two popular gardens that were kept by individual people; an older man and the other by a retired couple. Three Basic Co-operative Production units (UBPCs) and two CCSs which both belong to the co-operative sector. The organoponocos can belong to either one, the co-operative sector or the state sector.

*San Miguel Del Padron* is one of the poorest municipalities in Havana and is located on the southeastern outskirts of Havana. *Cotorro* is 16 kilometres from Old Havana, also towards the Southeast. *Alamar* is on the coast in the municipality of *Habana del Este*, on the eastern side of Havana. *Luyano* (*Diez de Octubre*) is one of the oldest municipalities in Havana and is located in Central Havana. *Santos Suárez* is also located in Central Havana next to *Luyano*. *Poye* is a municipality in south Havana.

## 9. Results

Cultivation in the different visited sites had begun from anywhere between two to 40 years. Most had begun cultivating during the Special period, which had forced the Cuban people to try and become more self-sufficient. In addition produce coming from rural areas had become more sparse because of the soil that had become tired from all the chemical inputs and transportation stopped altogether. This had forced the urban communities to tend for themselves. All in all as the economy of Cuba was worsening it became essential for the locals to begin producing food for family, friends and neighbours alike.

Some of the interviewees said cultivating is "*Una forma de vida*" (a way of life). For many it seemed to be something that had been done this way for a long time and that they were very accustomed to it. In most part I got the impression that most of the farmers were very proud of the fact that the community tends to the needs of the poor, the schools, retirement homes,

maternity hospitals, military and other government run companies. It seemed that a big portion of the produce goes to the underprivileged part of the community, which of course leaves the possibility of making profits from the produce quite minimum. In addition to filling the needs of the communities food security the produce has other uses as well. At the privately kept popular gardens both of the interviewees said that they cultivate because they like it. The pensioner couple who were a agronomist and a gardener told that the time spend in the garden is quality time for the two of them. They said that they enjoy when people come and visit their garden. School groups and grown ups alike. That it is important for the youths of today to learn about the nature and gardening because they do not know too much about these kind of things anymore. Most of the sites visited said that they have kids coming to their sites to learn and practice gardening and about healthy nutritious food. According to Koont(2011) the schoolchildren in Cuba are formally educated in agroecology and urban agriculture. Education is never completely separated from practice. The urban agriculture production sites are urged to establish links with primary schools nearby. The urban farmers visit the schools to share their knowledge with interested students and the students also visit the production units or they can start an activity on school grounds. So they can gain practical experience for example in irrigation, drainage or medicinal plants. (Koont, 2011).

Ornamental plants are grown at many sites. They are grown for decorative purposes. Most of the gardens have various plants grown which are meant specifically for religious purposes, such as ceremonies, rituals an traditional healing in *Santeria*. *Santeria* or *Regla de Ocha*, which is a Caribbean religion that is a mix of West African Yoruba religion which was brought by the slaves from Nigeria and of Catholicism that was the religion of the Spanish conquistadors who brought the slaves to the Caribbean. Some of the herbs used in traditional healing and other religious purposes are thyme (*Thymus*), lemon grass (*Cymbopogon citratus*), datura (*Datura candida*) and quinine (*Cinchona officinalis*). These are plants that are typically used in ethnomedicine. In Cuba many people still trust folk medicine and traditional healing methods so typically the urban gardens have specific areas just for the cultivation of these plants.

Most of the mint ((*Mentha*) produced in the farms was sold to bars and hotels selling Mojitos to the tourists. Of all produce around 15% goes to restaurants and cafeterias.

A part goes to the workers of the sites and a part goes to feeding the workers at close by factories or other facilities. The remainder of the produce is sold at sales points to the public and at various farmers markets. The destination of the produce varied according to the type of the site. However it was not totally contingent to the type of the site. From the more official sites like the bigger organopónicos, UBPCs and the CCS cooperatives visited some of the produce also went to the families of the workers. From the smaller gardens none of the produce

went to the official farmers markets or to the sales points but was mainly meant for the close people of the gardeners. The word *autoconsumo* was mentioned several times. In Murphys development report *autoconsumo* is described as follows; self-provisioning gardens that produce for the workers and belong to them as well. Usually these gardens supply the cafeterias of a particular workplace, an institution often on-site at hospitals, schools and factories. (Murphy, 1999) In my experience the gardeners to whom I talked to it was meant exactly like this but sometimes it just meant that the close people like family, friends and neighbours were included in the parties that benefited from the harvest that was collected from the site.

A list of some of the plants that were grown on the gardens where I visited:

### **Fruits**

Avokado	<i>Persea Americana</i>
Banana	<i>Musa L. Musaceae</i>
Orange	<i>Citrus L.</i>
Mango	<i>Mangifera indica</i>
Guava	<i>Pisidium guavaja</i>
Coconut	<i>Cocos nucifera</i>
Lemon	<i>Citrus</i>
Lime	<i>Citrus</i>
Papaya	<i>Carica papaya</i>
Pepino	<i>Solanum muricatum</i>
Grapefruit	<i>Citrus x paradisi</i>
Grape	<i>Vitis</i>

### **Vegetables, roots and tubers**

Beet	<i>Beta vulgaris</i>
Okra	<i>Abelmochus esculentus</i>
Spinach	<i>Spinacia oleraceae L.</i>
Salads	<i>Lactuca sativa L.</i>
Tomato	<i>Solanum lycopersicum</i>
Cassava	<i>Manihot esculenta</i>
Onion	<i>Allium cepa</i>

Garlic	<i>Allium sativum</i>
Carrot	<i>Daucus carota subs. sativus</i>
Celery	<i>Apium graveolens</i>
Sweet potato	<i>Ipomea batatas</i>
Chard	<i>Beta vulgaris subsp.vulgaris</i>
Corn	<i>Zea mays</i>
Cuban squash	<i>Cucurbita moschata</i>
Many squash types	<i>Cucurbita</i>
Many types of beans	<i>Fabaceae</i>
Mustard	<i>Sinapsis</i>
Radish	<i>Raphanus sativus</i>
Eggplant	<i>Solanum melongena</i>

## Herbs

Several types of Basil *Basilicum*

Parsley	<i>Petroselinum crispum</i>
Chives	<i>Allium schoenopranum</i>
Coriander	<i>Coriandrum sativum</i>
Cinnamon	<i>Cinnamomum</i>
Sage	<i>Salvia officinalis</i>
Several types of mint	<i>Mentha</i>
Oregano	<i>Origanum vulgare</i>

## Other

Pistachio	<i>Pistacia vera</i>
Aloe vera	<i>Aloe vera</i>

The interviewed gardeners get their seeds from various different sources: agricultural shops, agricultural centres, consultant houses, different cooperatives, from the market gardens and sale stands. Many buy their seeds from government owned specialized seed companies. Some interviewed gardeners have their own seed production or they swap seeds between gardeners and cultivators. Some interviewees mentioned that they take cuttings from their own plants and propagate the plants themselves. Control of seed quality is extremely strict in Cuba in the sites that



are registered in the official urban agriculture program but it does not apply to all urban gardens that are outside the bounds of the official control system.

The size of the sites ranged from 0,01 ha to 11,4 ha and varied from recreational to highly professional garden types. Many aim to cultivate monthly short crop rotation plants (21-45 days) such as salads and beans. The idea is to get the produce to the consumer as quickly as possible. The yields per year vary depending on the crop: yucca 1/year, banana 4/year, sweet potato 2/year and on variables like temperature and season.

The annual yield at an organopónico can be as large as 150-300 tons/ha, from the semiprotected organopónico 165 tons/ha and from the protected organopónico anywhere between 200-500 tons /ha. In other visited sites the yields are from 14 to 19 kilograms per m<sup>2</sup>. Many also said that they had never counted the amounts.

Many repellent plants were used as pest control: marigold, basil, chives and oregano, corn and sorghum on the edges of the cultivations. Neem tree extract was commonly used as a pest control spray. A laundry detergent called *Ecofer liquido* was also used by many gardeners. The gardeners mixed the liquid detergent with water.

Mostly the gardeners used organic fertilizers, such as worm compost, animal dung, urea or organic material from the harvested produce. Sometimes the concept of organic seemed a bit vague. The truth still is that there are no chemical fertilizers or pesticides available in Cuba.

The soil is prepared at the site from organic materials. Typically the soil is made from compost, worm humus, animal manure and red soil. Zeolite supplement was mentioned also several times, which is a volcanic natural mineral.

Zeolite increases the potential plant production, in other words the crop. It remains a long time in meaning that it has a prolonged possibility of absorbing by the plant. It neutralizes soil pH and deodorized after fertilization. It holds the penetrated water and stores and releases it accounting to the plants needs. It heightens water retentiveness and ventilation by keeping the soil soft and reducing its mass. It also absorbs harmful gas from the soil and prevents the roots from rotting. (Gih Hwa Enterprise Co. 1997-2015).

Everyone uses crop rotation in. At every site I visited it was used. Pea plants are commonly used to collect nitrogen and there were certain plants, which were mentioned often as favourable crop rotation plants. These were Cassava, sweet potato, squash and of course the different pea plants. At one of the visited cultivations they mentioned growing salad saplings specifically for crop rotation purposes.

Irrigation is done when water is available. Rainwater is collected in barrels or containers or the water is gathered from wells or irrigation canals. Some sites use drip-irrigation, mainly the organopónicos. At some sites they had a motorized system, while some are still operated manually. At most sites they said that they use magnetized water. This is a method that is supposed to improve crop yield but it does not have much scientific evidence to confirm its efficiency.

Lack of water was seen as one of the major problems in urban agriculture in Cuba by the gardeners. Second biggest problem was diseases. Secondly mentioned problem was the lack of pesticides. The need for proper equipment and fertilizers were mentioned as major problems as well. Pests and weeds are a major problem as well as thieves in some of the sites. Yields are small because everything is ecological. Other difficulties arise from heat and humidity and transportation problems.

The advantages in urban agriculture were many. The fact that the consumers are near the cultivations and thus the produce can be sold fresh, as there is no need for long transportation. Because of this the farmers felt that the economy is stronger than it would be if the production would be managed in rural areas. Interacting with locals and educational benefits for youngsters, were mentioned several times as advantages. A strong feeling of community is appreciated and the possibility of being able to help others in need. Workers and owners live close to the cultivations and the marketing of goods is easy. Gardens bring happiness to the locals, relieve stress and they beautify the city.

#### Case study – UBPC *Organopónico Vivero Alamar*, 1997-2011

The cooperative has a wide and valuable connection with the surrounding community. They have about 800 m<sup>2</sup> of area for cultivation which they have modified in to productive cultivation sites.

The same areas used to be unsuitable for cultivation. At their site they produce fresh vegetables: Main crops lettuce, tomatoes, Swiss chard, cucumbers, cabbage, beets and eggplant. Ancillary crops are carrots, green beans, celery, cauliflower, mint, parsley, okra and green peppers. And these products are being sold at reasonable prices.

They have established self-sufficiency in irrigation by obtaining their own wells. In the list of establishment are also several new workplaces, bringing the younger generation in a more direct connection with agriculture and have 168 employees.

There are several social benefits that are gained for the workers during the fourteen years of UBPC *Alamars`* existence These benefits include; Free breakfast and lunch for the workers, barber and

manicure services, sanitary services and clothes, protective clothing, the possibility for zero interest rate loans and the cutting of working hours to seven in the winter and six in the summer.

Many gained accomplishments are primarily due to the strong feeling of involvement and anthropocentric approach with the following measures; working conditions, the possibility of promotion, continual economical briefing, enhancing the standard of living by using commodities, diversifying of production, collective management, working together with research facilities (such as; INIFAT, INCA, CENSA, INSS etc.), collaboration with NGO's like German agro association, ACTAF and ACPA and continual collaboration with the co-operative association.

The organic management of cultivations include; compost production, worm humus production and humic acid production. Humic acid is extracted from humate. It improves the formation of soil structure, aeration, water holding capacity, cell division, root growth, permeability of plant membranes which then promotes the uptake of nutrients, seeds germination capacity and enhances the growth of various micro-organisms groups. (IFI CLAIMS, 1999). The materials used are plant residue from harvesting of crops, cow-, sheep -, goat – and rabbit manure. The aim of compost, worm humus and humic acid production is to produce special substrates, the direct application to the cultivations, foliage nutrient, the prevention of fungi and insects, application in irrigation water and for sales.

To prevent diseases the cultivations are adequately nourished and proper crop rotation is used and there are living barriers as well as pest repelling and attracting plants. At the site they raise insects that eat or prevent pests. The biodiversity is enhanced and there is a centralized and preventive dosage of natural and laboratory based bio toxins. There is monitoring of the entrance and protection of sites by using color traps and observing the cultivations on a daily bases.

With the knowledge that they have obtained during the last years of the cultivation they have managed to create techniques in soil nutrition and disease prevention which is continually completed with the newly obtained techniques.

In each square meter cultivated 10 kg of organic material is added to improve structure of the soil, the humidity of the soil and to slow down decomposing. To immediate receiving of nutrients and to activate the micro-organisms 1-3 kg of worm humus is added on each cultivated square meter.

The use of healthy and strong saplings and the omission of stress by replanting gives better tolerability of rain and wind.

In irrigation the maximum availability of water for plants is guaranteed by applying small quantities of water in short periods of time. This also cuts down the eroding of soil, stabilizes soils temperature, helps in the exploitation of nutrients and saves water as well.

## 10. Conclusion

Most of the methods used in organic urban agriculture in Cuba are similar to the ones that are used in Finland and as I have understood in Finland the urban gardening movement strives to implement organic conventions as well. The basis for urban agriculture in Cuba compared with Finland is so different that it is quite difficult to compare. The cultivation methods that are used in UA Cuba are commonly known in organic small-scale gardening. In Cuba they use repellent plants, crop rotation, bio-fertilizers, integrated pest management etc. It is about preventive methods such as it is in other parts of the world in organic agriculture. The crops are often grown in high-level cultivation beds as they typically are in places where it is important to save space and the area for cultivation is limited. Also the type of plants that are cultivated in Cuba are mostly suitable for a totally different climate than the ones that we would cultivate here in Finland. The semi-protected cultivation system that protects the plants from the hot sun would not give the same kind of benefits here in Finland as it does in Cuba even when it is also partially to protect from the pests. In Finland we can just use greenhouses, which protects from the cold nights but will not over heat because there is no tropical climate.

Therefore I did not find much, which could in effect be adapted to Finland per se, at least not in the methods or cultivation techniques. There definitely can be something to learn in the attitudes of people about sharing and in the sense of community. Even though the Cubans do not have much to give they are willing to share from what they have. Obviously it is part of the whole socialistic system but I got the impression that there was more to it. The farmers genuinely seemed to appreciate the possibility to be able to help others in need. The feeling of collectiveness and genuine will to help the less advantaged was strong.

## 11. Discussion

The original plan was to interview agronomists at the University of Havana, employees of the Ministry of Agriculture (MINAG), Alexander Humboldt Institute of Fundamental Research in Tropical Agriculture (INIFAT) and farmers around Havana to get a clear picture of today's Urban Agriculture. In the end I did not meet any of these contacts and interviewed the urban farmers on my own. The lack of support from the official and governmental sources made it quite difficult to find people willing to talk. I was declined entrance to several sites due to the lack of assistance from official sources, and therefore lacking the necessary official permits which are essential in Cuban society. I managed to gain the trust of 13 different interviewees and visited 16 sites in all. Three of the sites I visited allowed me to observe their cultivations. Observation was a crucial part of my study because there was a language barrier as locals only speak Spanish, which for me is a fourth language so sometimes I could not understand all that was explained to me. Many things were pointed out to me when my linguistic abilities were not adequate enough. Still I was able to gain a

lot of information on urban agriculture in Havana. Comprehending what the farmers told me became easier every time.

When I left for Cuba I thought that urban agriculture there would be just for the reason of being able to feed the population. When I was in Cuba I noticed that for some of the gardeners food security wasn't always the first issue they talked about when talking about their gardens and their produce. It seemed that sometimes other aspects were equally important or even more so than just the ability to produce food. The fact that urban agriculture is organic in Cuba was obviously very important for the gardeners in Havana. They seemed very proud of this fact. The gardeners also mentioned several times that beautifying the city and making its ambiance better through gardening was an essential point as well as teaching the local kids about healthy diets and the importance of nature. Almost every one of the interviewees mentioned that one of the best things in cultivating in the city has something to do with the possibility of helping others. Even when most farmers told that they had started cultivating for the necessity to produce food for the community it was not the sole objective. People in Havana tend to their gardens with passion and pride. Many of the gardeners and farmers said that they spend all of their free time at the sites and some of them had other jobs as well besides gardening or cultivating. Like one of the gardeners told me, when talking about why he cultivates in Havana. I quote; "It is a way of life."

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## **APPENDIX I**

### **Interview questionnaire**

1. How long have you cultivated/had your garden?
2. How big is your garden?
3. Why did you start growing ( vegetables/fruits/herbs ) edible agricultural products?
4. What do you grow at your garden/cultivation?
5. Where do you get your seeds and plants from?
6. What materials is the soil made of?
7. Do you use crop rotation?
8. How do you manage your irrigation?
9. Do you use allelopathy?
10. What kind of fertilizer do you use?
11. What kind of pest control do you use?
12. How big yields do you get?
13. What happens to your yield? Who gets it? Do you sell it?
14. How many yields do you get per year?
15. What are the major problems at cultivating in the city?
16. What are the advantages at cultivating in the city?